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Johnson et al.

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(54) **SUPPORT FRAME**

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B07B 1/49 (2006.01)

(52) **U.S. Cl.** **209/405**; 209/399; 209/403; 209/408; 209/412

(58) **Field of Classification Search** 209/399, 209/403, 405, 408, 412
See application file for complete search history.

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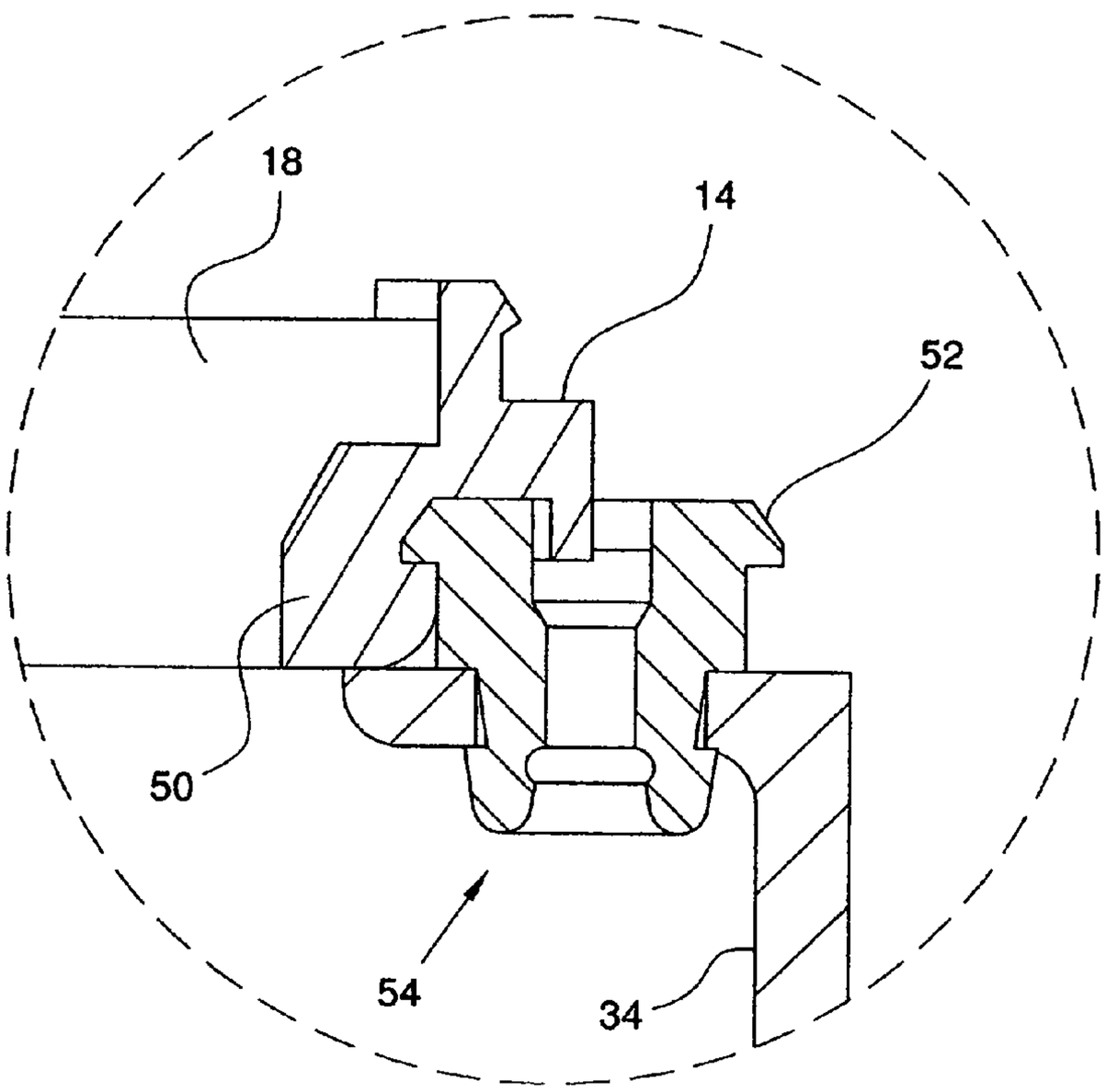
(57) **ABSTRACT**

A screening assembly support frame includes a body member defining a longitudinal axis. The body member has a pair of parallel, spaced elongate support members with a spacer arrangement extending between the support members. An engaging formation, for engaging a screen panel of the screening assembly to be supported by the body member, is carried on each support member with the body member and the engaging formations being symmetrical about the longitudinal axis.

6 Claims, 7 Drawing Sheets



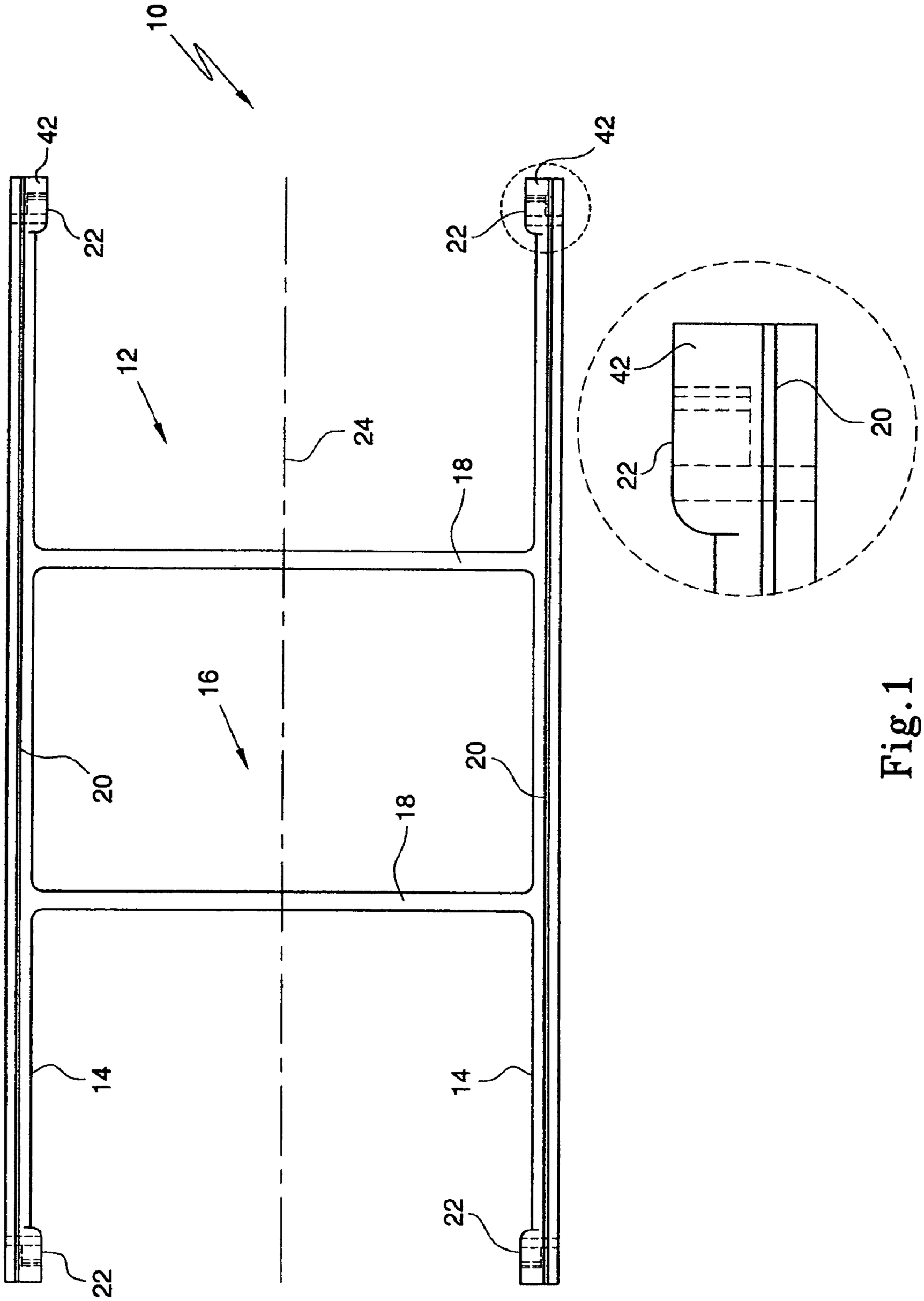


Fig.1

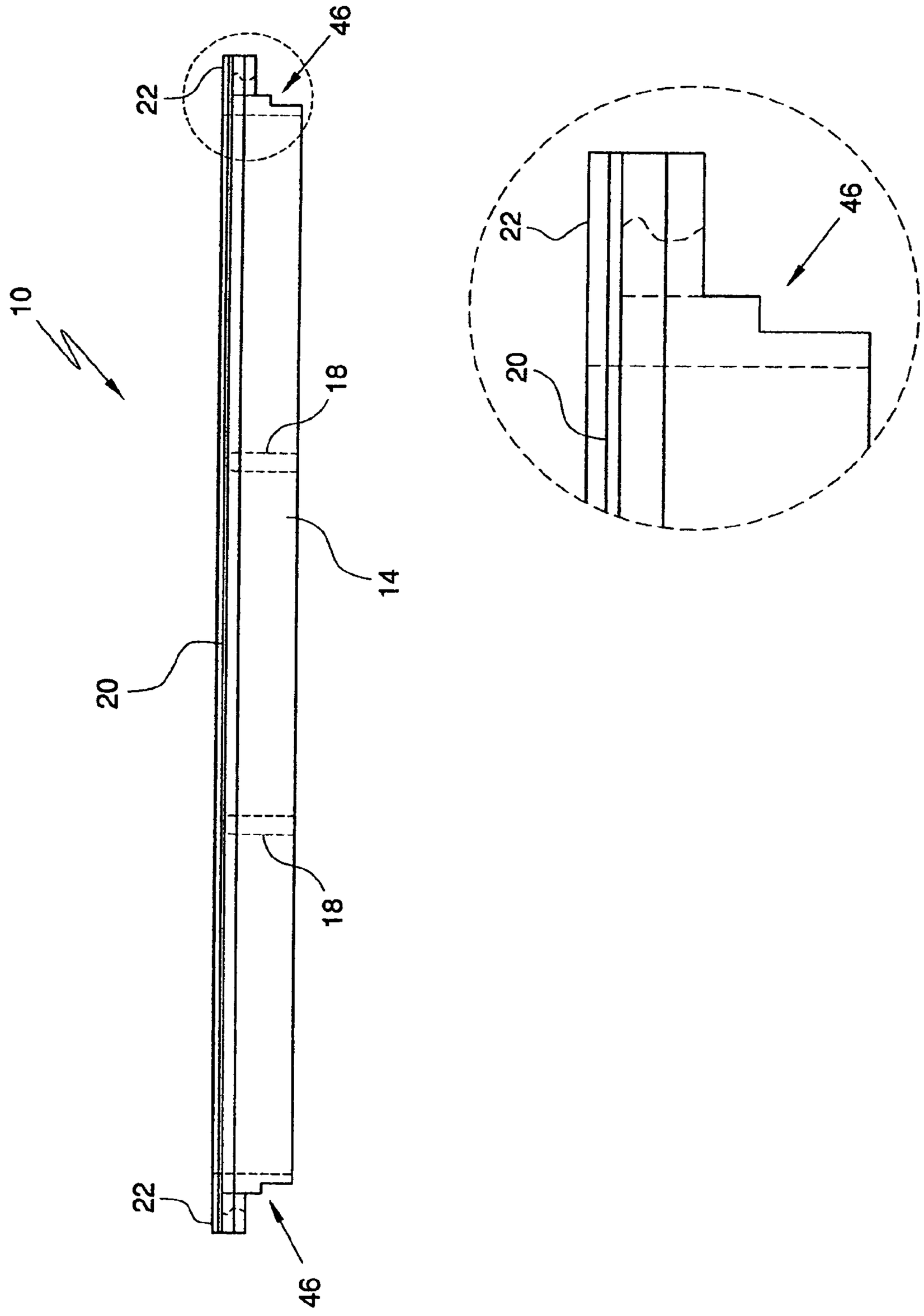


Fig.2

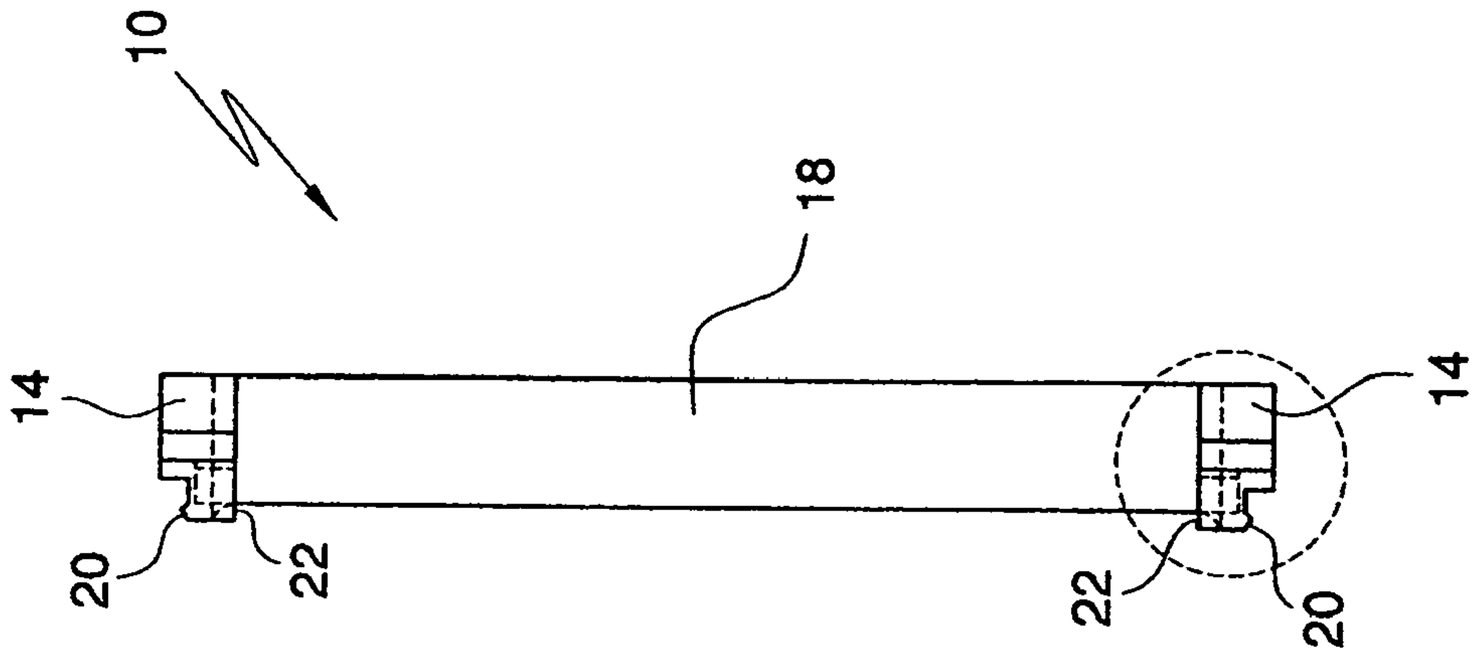
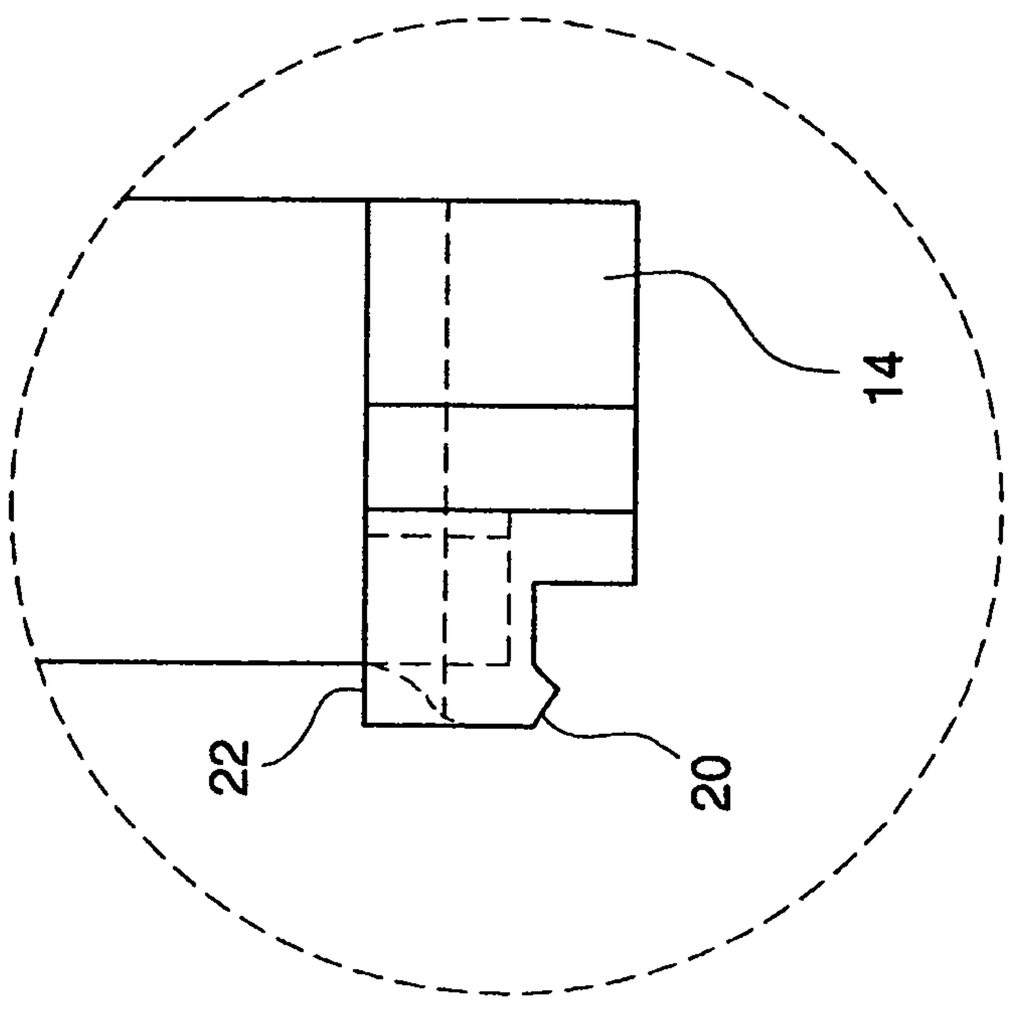


Fig.3



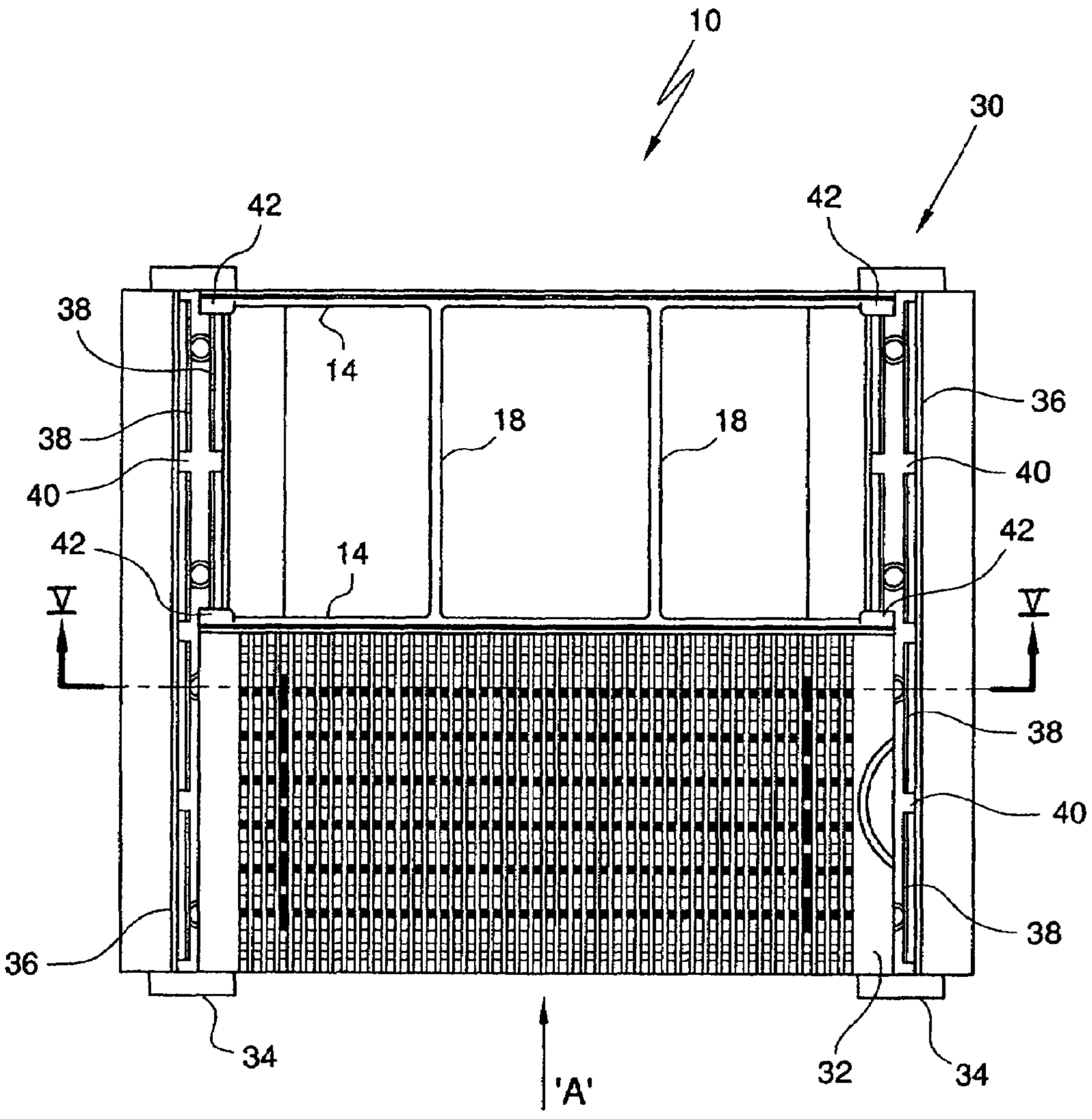


Fig.4

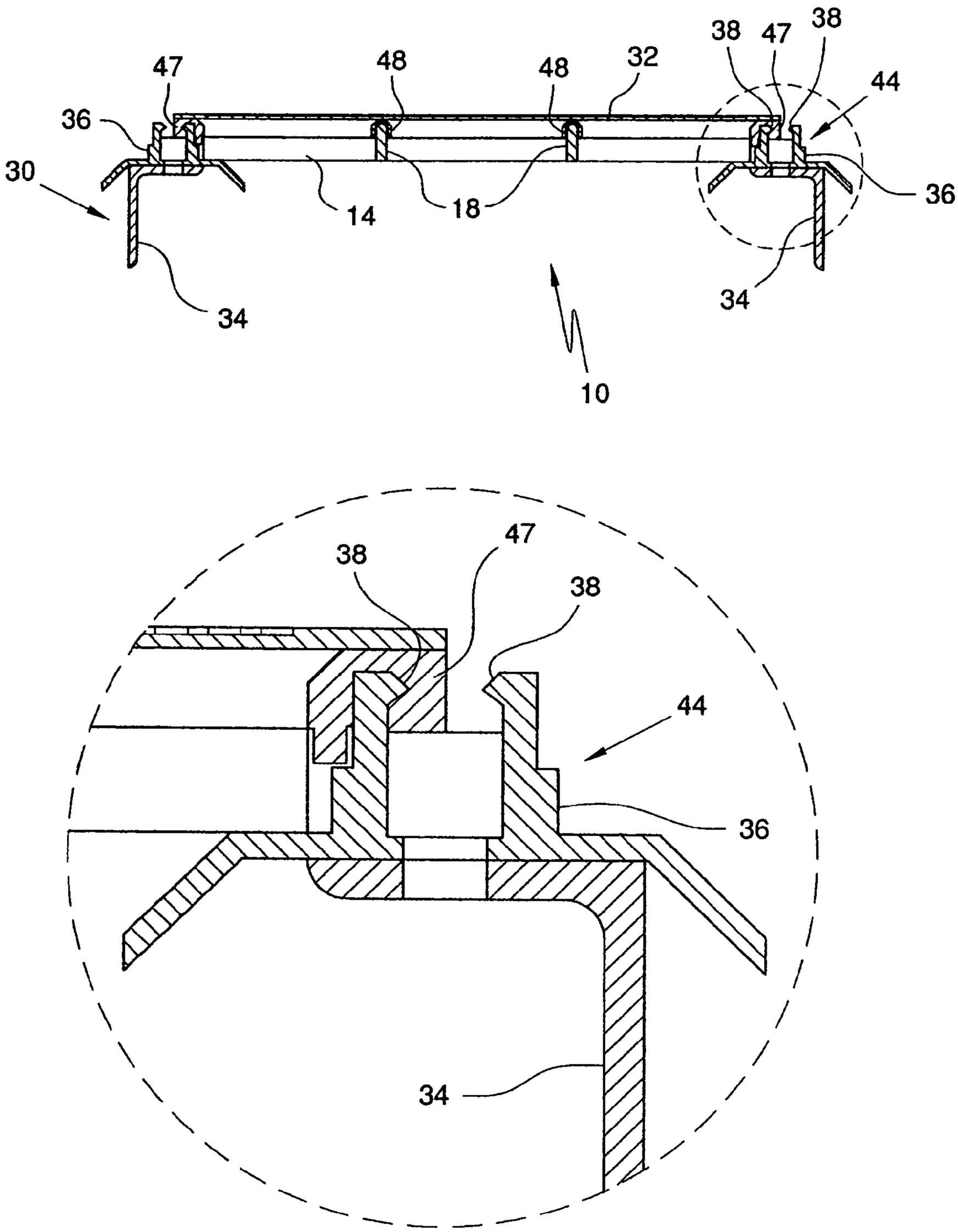


Fig.5

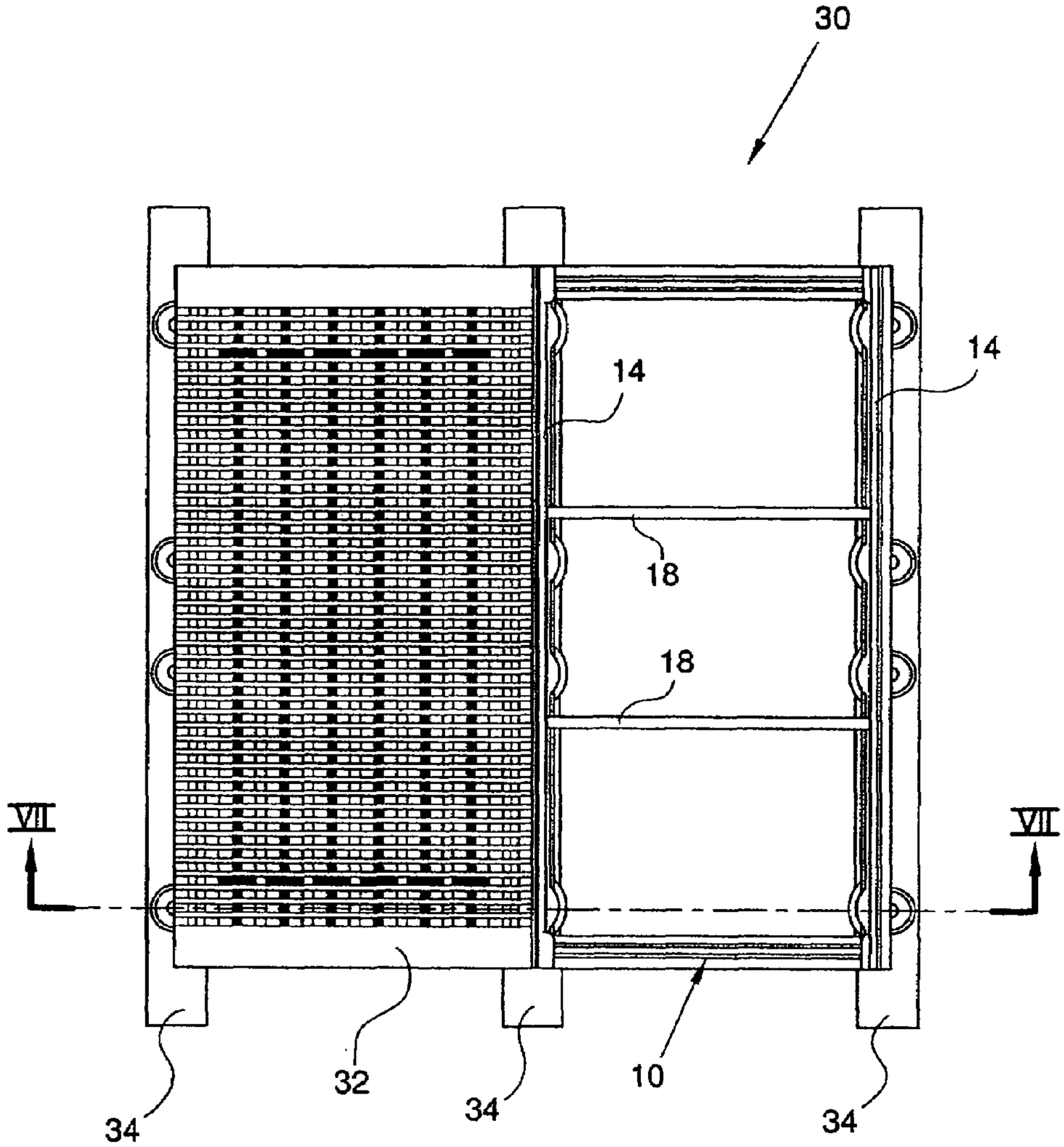


Fig.6

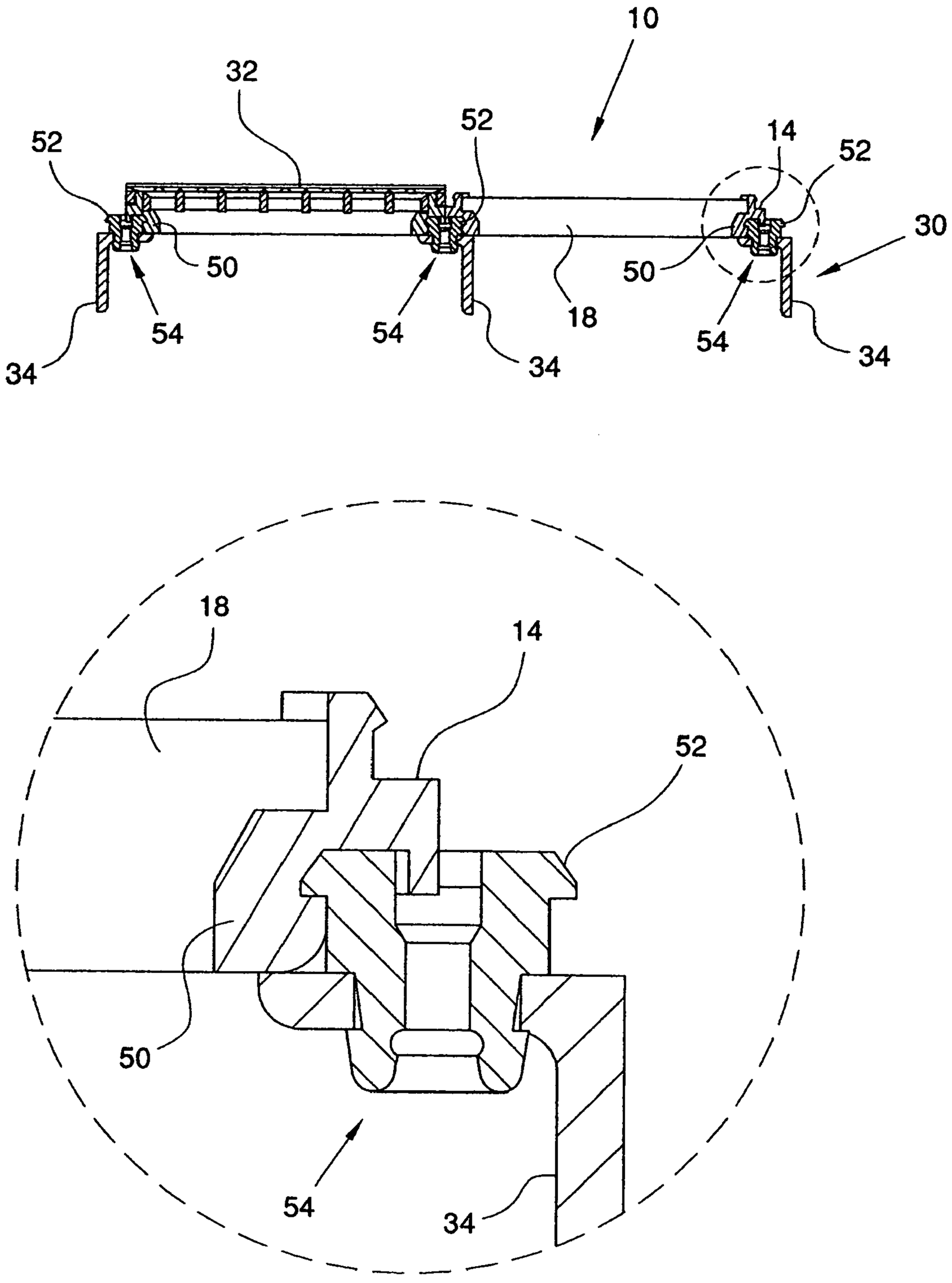


Fig.7

SUPPORT FRAME

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority to Australian Patent Application Serial No. AU 2005201683, filed on Apr. 20, 2005, which application is herein incorporated by reference in its entirety.

FIELD

This invention relates to a screening assembly. More particularly, the invention relates to a screening assembly support frame.

BACKGROUND

Screening arrangements are widely used in the mining industry, particularly the coal mining industry, for the screening or classifying of ores and slurries. Material to be screened is passed over a vibratory screen deck. Apertures of screen panels arranged on the screen deck pass material having dimensions smaller than the screening apertures of the screen panels while materials having dimensions larger than those of the apertures are retained on a top surface of, and traverse, the panels of the screen deck for further processing.

Due to the abrasive nature of the material being screened, the screen panels wear out, lose their screening efficiency and require replacement. Often, to ensure that the screen panels only pass materials smaller than the relevant aperture size, the screen panels are reinforced to inhibit distortion of the screen panels. It is costly to dispose of such a screen panel. To overcome this problem, the screen panels are provided in two parts with a screen panel removably attached to a support frame. With this arrangement, only the screen panel needs to be replaced when it is worn and the support frame can be reused.

There is a need to provide a more versatile support frame.

SUMMARY

According to the invention, there is provided a screening assembly support frame which includes:

a body member defining a longitudinal axis, the body member having a pair of parallel, spaced elongate support members with a spacer arrangement extending between the support members; and

an engaging formation, for engaging a screen panel of the screening assembly to be supported by the body member, carried on each support member with the body member and the engaging formations being symmetrical about the longitudinal axis.

In one embodiment, at least one end of each support member may carry a mounting formation for mounting the body member on an underlying screen deck. Preferably, each end of each support member carries a mounting formation.

In another embodiment, each support member may define at least one receiving formation in an operatively bottom surface for receiving a complementary part of a locating pin for attaching the body member to an underlying screen deck. Preferably, each support member defines a plurality of spaced receiving formations in each of which a locating pin is receivable.

The spacer arrangement may comprise a plurality of longitudinally spaced, transversely extending elements extending between the support members. For example, two longitudinally spaced elements, or struts, may extend between the support members.

Each engaging formation may comprise a clip arrangement for clipping engagement with a corresponding formation of the screen panel. The clip may be a continuous rail-like clip arranged on a top surface of its associated support member. Instead, each engaging formation may be a non-continuous, interrupted clip arrangement carried on the top surface of its associated support member.

The engaging formations may be integrally formed with the body member as a one-piece unit. The body member may be of a synthetic plastics material and may be moulded. Thus, the engaging formations may be moulded with the body member. The plastics material may carry reinforcement.

The plastics material may be a polyurethane material and the reinforcement may be steel reinforcing which also serves to inhibit shrinkage of the plastics material on moulding to minimise distortion of the body member.

The invention extends to a screening assembly including the support frame as described above.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention are now described by way of example with reference to the following drawings in which:

FIG. **1** shows a plan view of a screening assembly support frame, in accordance with an embodiment of the invention;

FIG. **2** shows a side view of the frame;

FIG. **3** shows an end view of the frame;

FIG. **4** shows a plan view of a part of a screening assembly including the support frame;

FIG. **5** shows a sectional side view of the part of the screening assembly taken along line V-V in FIG. **4**;

FIG. **6** shows a plan view of a part of a screening assembly including another embodiment of the support frame; and

FIG. **7** shows a sectional side view of the part of the screening assembly taken along line VII-VII in FIG. **6**.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

In the drawings, reference numeral **10** generally designates a screening assembly support frame, in accordance with an embodiment of the invention.

The support frame **10** includes a body member **12** defining a pair of spaced parallel elongate support members **14**. The support members **14** are retained in spaced relationship by a spacer arrangement **16**.

The spacer arrangement **16** comprising a pair of longitudinally spaced transversely extending elements, or struts, **18**.

Each support member **14** supports an engaging formation in the form of a clip **20**. The clips **20** engage complementary formations of a removable screen panel of a screening assembly, as will be described in greater detail below.

In this embodiment, a mounting formation **22** is defined at each end of each support member **14**. Each mounting formation **22** is also in the form of a clip for engaging an intermediate rail mounted on an underlying screen deck, as will be described in greater detail below.

As shown more clearly in FIG. **1** of the drawings, the support frame **10** defines a longitudinal axis **24**. The arrangement of the body member **12**, the clips **20** and the mounting formations **22** is such that the support frame **10** is symmetrical about the longitudinal axis **24**. This improves the versatility of the support frame **10** and allows for rapid mounting or demounting of the support frame **10** without the need for first

determining in which direction the support frame **10** needs to oriented. This reduces the downtime of the screen deck thereby improving the efficiency of the screen deck.

The support frame **10** is a one piece moulding of a suitable synthetic plastics material. More particularly, the support frame **10** is moulded from a polyurethane material. The polyurethane material has a Shore Hardness of 93A or 95A, depending on the application of the support frame **10**.

In addition, the support frame **10** is reinforced. Steel reinforcing (not shown) in the same shape as the support members **14** and the struts **18** is first placed in the mould and the polyurethane is moulded about the steel reinforcing. The reinforcing serves to inhibit distortion of the support frame **10**, maintains the rigidity of the support frame **10** and inhibits shrinkage of the polyurethane as it cures.

In use, a plurality of the support frames **10** are mounted on a screen deck, part of which is shown at **30** in FIGS. **4** and **5** of the drawings. Those skilled in the art will appreciate that, what is illustrated in FIGS. **4** and **5** of the drawings is a with-flow screening arrangement where material flows in a direction of arrow A and slots of a screen panel **32**, supported on one of the support frames **10**, extend parallel to the direction of flow of material. Screening modules, comprising the support frames **10** with their attached screen panels **32**, can also be arranged in a cross flow arrangement (as shown in FIGS. **6** and **7**).

The screen panel **32** has a clip (not shown) running along an under side of each longer edge of the screen panel **32**, the clips of the screen panel **32** releasably clipping on to the clips **20** on the support members **14** of the support frame **10**.

The screen deck **30** comprises a machine frame having a plurality of spaced, parallel members **34**.

An intermediate rail **36** is mounted on each of the members **34** of the machine frame of the screen deck **30**. Each intermediate rail **36** has a pair of opposed clip-like formations **38**. As shown more clearly in FIG. **4** of the drawings, these clip-like formations **38** are interrupted by transverse slots **40**. The slots **40** are provided at regular intervals along the intermediate rail **36** to facilitate placement of the support frames **10** on the screen deck **30**. Typically, the pitch of the space in between adjacent slots **40** is half the length of the support frame **10**, the length of the support frame **10** being the spacing between outer sides of the support members **14**.

Each clip **22** of the support frame **10** is defined by a boss-like formation **42**. When the support frame **10** is mounted on the screen deck **30**, each boss-like formation **42** partially occludes one of the slots **40** with the clip **22** of that boss-like formation **42** engaging an end its associated clip-like formation **38** of the intermediate rail **36**. It will be noted in FIG. **4** of the drawings that these boss-like formations **42** take up half of the width of the slot **40** so that a boss-like formation **42** of an adjacent support frame **10** can be received in the same slot **40** in a tight fit to locate adjacent support frames **10** with respect to each other.

To facilitate stability of the screening assembly, each intermediate rail **36** is stepped, as shown at **44** in FIG. **5** of the drawings. Ends of the support members **14** are correspondingly stepped, as shown at **46** in FIG. **2** of the drawings, so that lateral movement of the support frame **10** on the intermediate rails **36** is inhibited.

To further inhibit lateral movement of the screen panel **32**, ends of the screen panel **32** carry clips **46** which clip on to the clip-like formations **38** intermediate those slots **40** in which the boss-like formations **42** of its associated support frame **10** are received as shown in FIG. **5** of the drawings.

In FIGS. **6** and **7** of the drawings, another embodiment of a screening assembly **30** is shown. With reference to FIGS. **4** and **5** of the drawings, like reference numerals refer to like parts unless otherwise specified.

In this embodiment, instead of the boss like formations **42** with their associated clips **22**, each support member **14** of the support frame **10** has a plurality of locating formations **50** defined at spaced intervals along an operatively bottom surface of the support member. Each locating formation **50** is shaped and dimensioned to engage a part of a head **52** of a locating pin **54** in a clip-like manner to secure the support frame **10** to the members **34** of the machine frame of the screen deck **30**. The locating formation **50** overlies and clips to half of the head **52** of its associated locating pin **54**. A locating formation **50** of an adjacent support frame **10** overlies and clips to the remaining half of the head **52** of the locating pin **54** to locate adjacent support frames **10** relative to each other. In addition, the shape of the locating formation **50** and the manner in which it abuts the side of the head **52** of its associated locating pin **54** serves to restrain the support frame **10** against lateral displacement relative to the locating pins **54**.

Each locating pin **54** is secured directly to its associated member **34** of the machine frame of the screen deck **30** and the intermediate rail **36** is omitted. In this way, a rail type screen deck **30** can be converted to a pin type screen deck **30**.

Each locating pin **54** is as described in the Applicant's co-pending Provisional Patent Application No. 2004905590 entitled "A screening module retaining member" filed 27 Sep. 2004. The contents of that provisional patent application are incorporated in this specification by reference.

It is therefore an advantage of the invention that a support frame **10** is provided which, being symmetrical about its longitudinal axis **24**, improves the versatility of the support frame **10**. The support frame **10** can therefore be rapidly placed in position on the screen deck **30** without a technician needing to know in which way the support frame **10** needs to be oriented. In addition, the same support frame **10** can be used with various types of screen panels **32**. While the illustrated screen panel **32** is shown with continuous slots, any suitable screen panel **32** could be used with the support frame **10** to achieve fine screening or coarse screening.

It is therefore a further advantage of the invention that a support frame **10** is provided that facilitates rapid removal of a screen panel **32** secured to the support frame **10** to allow that screen panel **32** to be replaced by another screen panel **32**. This is advantageous where a screen panel **32** has worn out or when it is desired to alter the application of the screen deck, for example, to change from one which does fine screening to one which does coarse screening or vice versa. It will be appreciated that it is not necessary to remove the support frame **10** from the underlying screen deck **30**. All that is required is removal of the screen panel **32** from its associated support frame **10**.

It is also to be noted that the upper surfaces of the struts **18** are rounded and that the screen panel **32** has channel defining members **48** which are received over the struts **18** but do not interlock with the struts **18**. This allows vertical displacement of the screen panel **32** relative to the support frame **10** and assists in dislodging material blinding apertures of the screen panel **32**.

It will be appreciated by persons skilled in the art that numerous variations and/or modifications may be made to the invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive.

The invention claimed is:

1. A screening assembly support frame, comprising:

a pair of support members, wherein the support members are elongated members which are substantially parallel;

two or more struts, wherein the struts extend between the pair of support members thereby supporting and spacing the support members;

a clip integral with each of the support members and configured to engage complementary formations of a removable screen panel, wherein the clip is a profile located on a top outside surface of each support member and extends substantially the entire length of the support member; and

a plurality of locating formations integral with the bottom of each of the support members and configured to removeably engage and secure to a head of a pin of an underlying screen deck, wherein the entire support frame is one piece of moulded material.

2. The screening assembly of claim **1**, further comprising a rounded top on the struts, wherein the rounded top is configured to engage one or more channel members coupled to the bottom of the removable screen panel, wherein the one or more channels are configured to allow vertical displacement of the screen relative to the support frame but prevent horizontal movement of the screen relative to the support frame.

3. The screening assembly support frame of claim **1**, wherein the support frame is molded from a synthetic plastic.

4. The screening assembly support frame of claim **3**, wherein the synthetic plastic is a polyurethane.

5. The screening assembly support frame of claim **1**, further comprising a steel reinforcing structure located within the support frame.

6. The screening assembly support frame of claim **5**, wherein the steel reinforcing structure is located within the support members and the struts and has substantially the same shape as the support members and the struts.

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